

THE  
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- I. *Descriptions of three new genera and species of fig insects allied to Blastophaga from Calcutta, Australia, and Madagascar; with notes on their parasites and on the affinities of the respective races.* By Sir SIDNEY S. SAUNDERS, C.M.G.

[Read September 6th, 1882.]

PLATES I.—III.

SOME time back Mr. Wood-Mason, on his return to India from this country, forwarded to me a small bottle containing about a dozen diminutive figs of *Ficus Indica*, which he had gathered in the Botanical Gardens at Calcutta on the 15th of May, accompanied by a glass tube wherein he had also plunged numerous minute insects which he had found in some of the same figs. Many of these figs, as he observed, had a large hole at the apex, made, as he conceived, by an obese grub, whereof specimens were also sent, one of these being found "in almost every receptacle." Such apertures, however, are usually effected by the inmates as the ordinary means of egress; and the presence of these

apod grubs, which could not have operated from without, would seem to be rather attributable to some later intruder having penetrated by such orifice into the fig to deposit her ova. In many instances the winged species of the fig-insects "issued from the mouth of the receptacle in a cloud the moment they felt the pressure exerted in pulling off the fig," which explains the absence of some of the sexes; although others, in a less advanced stage of development, were arrested when in the act of emerging from the seed-vessels wherein they had been nurtured. A large number of apterous individuals of different species, among which some approximating to those fancifully designated by Walker as "a working class" or "neuters?," pervaded the interior of these figs, many of these being more or less mutilated, and, as Mr. Wood-Mason remarks, "even the tips of the mandibles are often found bitten off." A similar result has been noticed in the males of *Sycophaga*, which never quit the fig, but are found dead within before the females are ready to emerge from the seed-vessels, impregnation having apparently been effected, as in *Blastophaga*, while they are still retained within the pericarp, after which period the females would seem to be unapproachable by these blind rovers. One of these male *Blastophagæ*, penetrating a seed-vessel containing the female, has been recently figured by Prof. Westwood in our 'Transactions' (1882, pl. iv., fig. 31); and in the 'Proceedings' of the Holmesdale Natural History Club of Reigate and Red Hill for 1880 (p. 48), presented to our Library, I have recorded some further observations thereon; but in the Australian species, hereinafter adverted to, fecundation is not limited to this early period (*vide diagnosin*).

The germ-feeders found in the *Ficus Indica* essentially differ from those of the European fauna, the serrate mandibular appendages of the female being of a more complex and elaborate character; the 11-serrate spatulate process attached to the base of the mandibles having also a rigid exarticulate lobe laterally appended thereto and free beyond its basal attachment, extending to about three-fourths of the length of the former, furnished with seven stout elongate teeth, as shown in Plate I., figs. 10 to 13. The antennæ in this sex are also very remarkable, the five terminal joints being distinctly separated from each other, the 8th to the 11th cyathiform, surrounded by a compact mass of recumbent setæ forming

a coronated apex; the 8th joint is considerably larger than the rest, which are nearly co-equal with each other, and the conical 12th is nearly concealed within its overlapping garniture. These large ornate joints, together with the small 5th, 6th, and 7th (the 5th being very minute) are cærulescent, the four basal joints contrasting therewith as pale yellow; of these the scape is elongate-oval, the 2nd joint longer than broad and internally curvate, the 3rd short and transverse, and the 4th projecting externally and constituting an acute elongate spine, the minute 5th joint being inserted at its inner base. (Plate I., fig. 14).

The veining of the fore wing is also very peculiar, the ordinary deflexed cubitus being entirely absent on the disc, the post-costal vein diverging from the costa and terminating towards the middle of the anterior margin, but apart therefrom, in an elongate clava having a beak-shaped apex, with a hair-like prolongation traceable far in advance. The posterior margin of the wing is obliquely deflected in a straight line from the base to about the middle, beyond which it is delicately fimbriated to the apex. The disc is smooth, with a series of fine striæ beyond its centre. The hind wing is subacuminatè at the apex, emarginatè behind at its base, with the costa and post-costal vein forming together a strong arcuate belt extending to about half the length of the basal curve, and having an oblique prolongation, less defined, up to the marginal centre where uniting with the fore wing by three hooklets.

The head of the female is elongate-oval, with the usual longitudinal furrow above, and having a prominent recurvate horn at the base. (Plate I., fig. 5). The thorax is of the same width as the head and rather longer; the fore legs are small, with the femora slightly distended, short curvate tibiæ, and long tarsi; the middle legs are long and slender, and the hind legs have short femora, broad at the base and narrow at the apex; the tibiæ are very short, narrow at the base, and broadly truncate at the apex; the tarsi very elongate; all being five-jointed. The abdomen is about the same length and width as the head; the ovipositor slender and flexible, about twice the length of the abdomen, and its sheaths, when apart therefrom, are usually spirally curled.

The apterous male has a small head, rather broader than long, with black subrotundate maculæ in the position

of the eyes, small trigonate bidentate mandibles, and short fleshy four-jointed antennæ, porrected in front; the 1st joint small and trigonate, recurved at the base; the 2nd larger and subovate; the 3rd shorter, its basal moiety contracted and curved; and the terminal joint oblong, tumid and setose at the apex. It may be readily distinguished from all others by its elongate, straight, anterior femora, as long as the prothorax, and closely pressed against its sides, with very diminutive broad crenated tibiæ, compressed five-jointed tarsi, and stout claws. The pronotum is very large and scudiform, the mesonotum short and transverse, and the metanotum narrower and rounded behind. The middle pair of legs (which are very long and slender in *Blastophaga*) are rather shorter than the others, with the femora subglobose, the hind tibiæ short and straight, and their tarsi, like those of the posterior pair, having five well-developed joints nearly equal in length, with moderate claws and long pulvilli. The coxæ and femora of the hind legs are very robust; the tarsi shorter than the middle pair, subtrigonate, and very broad at the apex, obliquely truncate, and armed with several stout spines; the claws rather larger than those of the intermediate tarsi, and internally dilated.

I propose to designate this very remarkable genus and species by the name of *Eupristina masoni*, as distinguished from all others by the wing-veins, and by the duplex character of the serrate mandibular appendages in the female, as well as by the peculiar structure of the fore legs in the male. The practical application of the additional lobe attached to the base of the serrate spatulæ, furnished with a collateral series of long teeth, may seem scarcely intelligible, although the action of the former is sufficiently obvious while the females are seen working their way out of the pericarps, swaying their heads to and fro to effect their emancipation. When, however, the fig is laid open, the seed-vessels, deprived of their usual moisture, soon assume a pergameneous consistency, retaining the hapless inmates by the thoracical region unless fresh moisture be freely applied. This difficulty may not unfrequently occur in a warm temperature, when the lateral lobe may be available as an additional aid to prevent the sides of the aperture from prematurely closing, and enable the serrate process to operate more freely and efficaciously by such double action.



## EUPRISTINA,\* n. g.

*Mas apterus*. *Caput* transverso-ovale. *Oculi* maculis subrotundis nigris indicati. *Antennæ* breves, glabræ 4-articulatæ; articulo 1mo parvo, subtrigono; 2do triplo majore, basi latiore externe rotundato; 3tio brevi, dimidio basali constricto, curvato; 4to tumido, ovato, apice setis brevibus instructo. *Mandibulæ* subtrigonæ, parvæ, bidentatæ. *Palpi* obsoleti. *Thorax* gibbus, capite dimidio latior; pronoto magno, scudiformi; mesonoto brevi, transverso, lateribus rotundatis; metanoto semicirculari. *Pedes antici* femoribus valde elongatis, rectis, lateribus parallelis, apice truncatis, basi constrictis, ad pronotum proximis longe porrectis; coxis oblongis, latis, disco compressis, concavis, apice oblique auriculatis, acutis; tibiis latis, brevissimis, latere crenatis, apice bilobatis; tarsis parvis, robustis, 5-articulatis, articulis brevissimis, arctissime conjunctis, unguibus majusculis; *intermedii* femoribus parvis, inflatis; tibiis brevibus, curvatis, apice dilatatis, spinosis; tarsis elongatulis, 5-articulatis, articulis æqualibus, tenuibus, unguibus parvis; *postici* majores, femoribus longioribus, crassioribus; tibiis subtrigonis, apice externe uncinnatis; tarsis medio-cubitis, 5-articulatis, articulis æqualibus, unguibus magnis. *Abdomen* elongatum, segmentis basalibus quatuor ventricosus, reliquis tribus sæpe subtus deflexis vel intus retractis, tubum elongatum efficientibus; genitalium apice haud rarius ultra caput subtus porrecto.

*Fæmina* alata. *Caput* vix longius quam latum, postice paullo latius, disco in longum fossulatum, lateribus prominulis, antice transverse canaliculatis. *Oculi* magni, ovales. *Ocelli* inconspicui. *Mandibulæ* satis magnæ, basi latæ, apice bidentatæ; spatula basali elongata, exarticulata, subter capite retro producta, striata, striis in dentibus fere 11 acutis latere interno productis; cujus ad basin lobo angusto, elongato, rigido, exarticulato, proximo sed diviso, latere interno affixo, hoc dentibus 7 instructo; his et illis duplici serie simul oblique distinguendis. *Clypeus* marginis medio in angulum deflexum productus. *Mentum* profunde situm, basin versus processu frondiformi utrinque usque ad apicem producto. *Labium* elongatulum, tenue, palpis gracillimis. *Maxillæ* biarticulatæ, articulis elongatis,

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\* *πριστης*, qui serrâ secat.

basali tumido, apicali tenui. *Antennæ* capite fere duplo longiores, 12-articulatæ; scapo magno subovali, articulo 2do oblongo, sinuoso; 3tio brevi, transverso; 4to in spinam acutam externe producto; 5to minimo; 6to et 7mo angustis, parvis; 8vo maximo, cyathiformi, setis densis recumbentibus antice productis vestito; 9no—11mo præcedenti similibus sed minoribus, coæqualibus; extimo setis oblecto, conico. *Thorax* capitis latitudine, dimidio longior; pronoto scudiformi, angulis anticis rotundatis; mesonoto subquadrato, metanoto angustiore, postice rotundato. *Alæ anticæ* latæ, postice basi usque marginis mediam oblique truncatæ, deinde usque apicem ciliatæ, disco glabro; costa abbreviata, vena postcostali inspissata, a margine late divergente, parum arcuata, longitudinis alæ ante mediam in clavam elongatam acuminatam recte producta, antice margini propinque tenuissime prolongata; *vena deflexa cubitalis* deest: *alæ posticæ* subacuminatæ, postice basi emarginatæ, margine fimbriatæ; costa cum vena postcostali coalitis arcuatis, basi validis; hæc marginis medio setis brevibus tribus deflexis apice instructa. *Pedes*, tarsis omnibus 5-articulatis, pulvillis valde productis; *antici* parvi, coxis subovalibus, femoribus superne arcuatis, subtus rectis; tibiis brevibus, curvatis, apice dilatatis, spinosis; tarsis longioribus, articulis subæqualibus, unguibus majusculis, tenuibus; *intermedii* longi, tenui, coxis transverse dilatatis; femoribus brevibus, parum inflatis, basi contractis; tibiis elongatis, subrectis, basi tenuioribus, apice angulo interno in spinam tenuem producto; tarsis elongatulis, articulo basali paulo longiore, unguibus parvis, gracilibus; *postici* coxis magnis, femoribus brevibus, basi valde dilatatis; tibiis robustis, brevioribus, basi tenuibus, apice recte truncatis, angulo interno uncinnatis; tarsis valde elongatis, articulo basali curvato, longiore, reliquis subæqualibus, unguibus majusculis, interne dilatatis. *Abdomen* ovale, thorace brevius; oviductu gracillimo, flexili, abdomine duplo longiore, vaginis tenuissimis sæpe in spiram flexis.

*Eupristina masoni*, n. s.

*Mas* testaceus, antennis pallide flavis, pronoti disco vitta ovali circumsignato, abdomine albedo. *Fœmina* capite (basi excepto) pedibusque pallide flavis; antennis articulis 4or basalibus (nonnullis 5toque) flavis, reliquis

cærulescentibus ; capitis basi thoraceque viridibus ; alis hyalinis, glabris, costa basi picea, vena postcostali lutea ; abdomine nitido, piceo, basi plus minusve testaceo. Long. corp.—mas,  $1\frac{1}{2}$  mm. ; fœmina,  $1\frac{3}{4}$  mm. Exp. alar.  $2\frac{1}{2}$  mm.

*Hab.* In grossis *Ficus Indicæ* e germinibus Maïæ Idus exeuntes horto botanico Calcuttæ. Dom. J. Wood-Mason cun ficibus ipsis amicissime communicavit.

In Mus. Hopeiano Oxoniæ, et nostro.

*Note.*—The measurements in the males of this and the two following species are exclusive of the retractile abdominal segments after the 4th. The relative length of the ovipositor in the females is computed from the apex of the abdomen, exclusive of its subjacent and more or less internally concealed basal portion.

I have also recently received from New South Wales both sexes of another remarkable species allied to *Blastophaga*, the ovipositor, however, being as long as the abdomen, and the mandibles of the female, together with their serrate appendages, being furnished with about thirty sharp teeth, forming one continuous saw from end to end, thus constituting a most effective implement, whose structure may favourably compare with any in use at the present day ; the falcate mandible representing the ordinary curvate handle, and the four following teeth appertaining to the broad base of the saw, the residue (twenty-six) being on the inner margin of the transverse striæ of the appendage. (Plate II., fig. 25).

The antennæ of the female are also peculiar. The scape is distended and suboval ; the 2nd joint short and as broad as long, the 3rd joint forming the usual spinose projection, though short and subtrigonal ; the 4th is longer than broad, but small ; the two following joints are compressed and longitudinally striated, equal in size, with the sides parallel, and truncate at the base and apex ; the 7th and 8th are shorter and somewhat cyathiform ; the last three (9th to 11th) forming an elongate fusiform clava.

The head is very large, much compressed, twice as long as broad, the sides parallel and rounded at the base, with a very short terminal horn. The thorax is about the same length as the head ; the prothorax narrow in front and subtrigonal, the apex being attached below

the base of the former, which is frequently deflected at right angles therewith; the mesothorax and metathorax are gibbous and as wide as the head. The fore wings have the cubital vein projected almost at a right angle on the disc, having a wedge-shaped clava pointing towards the outer margin, the disc being clothed with short recumbent setæ, and the margin fimbriated around. The hind wings have the costa and post-costal vein robust at the base and strongly arcuate, with a slight prolongation to a central marginal tubercle bearing two or three hooklets, the margin being fimbriated all round. The anterior and posterior legs are shorter than the intermediate pair, which are slender and elongate; the femora and tibiæ of the former are curvate, and those of the latter more robust, all the tarsi being elongate. The ovipositor is slender and curvate, slightly exceeding the length of the abdomen.

The apterous male has a small rotundate fuscous head, contrasting with the thorax, abdomen, and legs, which are fleshy white. It has seven-jointed antennæ projecting in front, and turned laterally after the 3rd joint. The basal joint is small and oblong, the 2nd large and subovate, the 3rd as long as the three following, which are small and compact, and the terminal joint is tumid and subglobose. (Plate II., fig. 20).

The foregoing characters will readily serve to discriminate this new genus and species, for which I propose the name of *Pleistodontes imperialis*, in allusion to the multi-serrate mandibular appendages of the female.

#### PLEISTODONTES, n. g.

*Mas apterus*. *Corpus* angustum, elongatum, molle. *Caput* parvum, subsphæricum, antice truncatum. *Oculi* parvi, rotundi. *Clypeus* pone antennas in longum canaliculatus, spina intermedia elongata, acuta, basi antice porrecta. (Tab. II., fig. 21). *Mandibulæ* parvæ, subfalcatæ, apice bidentatæ; processibus duobus brevibus, apice transverse dilatatis, conjunctis, inter mandibulas porrectis. (Tab. II., fig. 22). *Antennæ* elongatæ, glabræ, 7-articulatæ; articulo 1mo parvo, oblongo, apice latiore; 2do magno, basi rotundato, apice truncato, longitudine latitudinem dimidio excedente; 3tio elongato, curvato, tribus sequentibus semel longiore; his brevibus, transversis, arcte conjunctis; extimo (7mo)



tumido, magno, apice setis brevibus instructo. *Thorax* capite dimidio longior, antice capitis latitudine; pronoto elongato, postice vix latiore, truncato, lateribus rectis; mesonoto brevi, transverso; metanoto longiore, postice rotundato. *Pedes antici* robusti, coxis subquadratis, angulis rotundatis; femoribus basi valde dilatatis, apice sensim angustioribus; tibiis brevibus, curvatis, 5-articulatis, articulis compressis; unguibus validis. *Pedes intermedii* graciliores, coxis parvis, transversis; femoribus oblongis; tibiis elongatis, basi angustis, apice sensim sed parum dilatatis, inermibus; tarsis elongatis, 5-articulatis, articulis coequalibus; unguibus elongatis, parum incurvis; *pedes postici*, coxis magnis, subrotundis; femoribus ovatis; tibiis brevibus, basi constrictis, apice latis, truncatis, angulo interno biuncinnatis; tarsis robustioribus, 5-articulatis; unguibus validis, pulvillis dilatatis. *Abdomen* elongatum, segmentis basalibus paullo inflatis, reliquis sensim angustioribus, infra recurvis.

*Fœmina* alata. *Caput* maximum, elongatum, compressum, lateribus subparallelis, postice rotundatum, angulis anticis prominulis, disco in longum canaliculato. *Oculi* ovales, prominuli, basi propinque siti. *Mandibulæ* majusculæ, basi subquadratæ, transverse striatæ, apice falcatæ, acutæ, latere interno basi 4-serratæ, appendice basali longissima, multiserrata, transverse striata, dentibus fere 26 margine interno instructa. *Ocelli* invisī. *Antennæ* 11-articulatæ, clavatæ, capite paullo longiores, prope marginem anticum fossulæ insertæ; scapo elongato, subovali, basi apiceque attenuato; articulo 2do brevi, lateribus rotundatis, 3tio in spinam subtrigonam externe producto; 4to parvo, elongato; reliquis majoribus, in longum rugose striatis; 5to et 6to compressis, lateribus subparallelis, basi apiceque truncatis; 7mo et 8vo brevioribus, sensim latioribus; ultimis tribus (scilicet 9no—11mo) clavam fusiformem constituentibus. *Thorax* elongatus, capitis latitudine, lateribus subrectis; pronoto parvo, antice truncato, angulis postice productis; mesonoto brevi, transverso; metanoto longiori, postice rotundato. *Alæ anticae* latæ, vena postcostali basi cum costa coalita, postea in disco arcuata, apice ad marginem conjuncta; vena cubitali in rectangulum breviter deflexa, apice clava subtrigona acuta latere externo producta: *posticae* angustæ, elongatæ, basi constrictæ, vena postcostali, cum costa breviter coalita,



valida, arcuata, apice, marginis mediam versus, setis duabus tribusve brevibus, in angulum deflexis, instructa; alarum ambarum disco setis brevibus sparsim induto, marginibus gracillime fimbriatis. *Pedes* tarsis omnibus 5-articulatis; *antici*, coxis parvis, subquadratis; femoribus brevibus inflatis; tibiis elongatis, robustis, basi apiceque constrictis, inermibus; tarsis unguibusque parvis; *pedes intermedii* longi, coxis parvis, transversis; femoribus parum inflatis; tibiis, tarsisque, elongatis, gracillimis, unguibus subrectis; *pedes postici* breves, coxis subquadratis; femoribus robustis apice constrictis; tibiis brevissimis, subtrigonis, apice latis, truncatis, spina acuta elongata angulo interno armatis; tarsis robustioribus, articulo basali longiore, curvato; unguibus parvis, pulvillis dilatatis. *Abdomen* elongatum, basi thoracis latitudine, apice sensim attenuatum; oviductu gracili, curvato, abdominis fere longitudine.

*Pleistodontes imperialis*, n. s.

*Mas* capite saturate fusco; antennis, thorace, pedibusque pallide stramineis; abdomine albedo. *Fœmina* omnino nigra, alis cineris. Long. corp.—*mas*,  $1\frac{1}{4}$  mm.; *fœmina*,  $1\frac{3}{4}$  mm. Exp. alar. 3 mm.

*Hab.* Australasie, *Ficus macrophyllæ* grossis, *Ficus Australis* quoque; ab his mense Junio, illisve mense Februario, emergentes. Mares cum fœminis copula conjunctos in ficus pulpa liberos bis inveni.

In Mus. Hopeiano Oxoniæ, et nostro.

The species of *Ficus* from which these germ-feeders were obtained is described as having a long dark shining leaf, like that of the laurel, commonly known locally as the Moreton Bay fig-tree, growing wild in the mountainous regions, but introduced as an ornamental tree in gardens at Sydney. The insects were ready to emerge early in February, when, on opening some of these figs, many of their inmates flew out. Numerous specimens of a black species of *Idarnes* (all females) with a tubiform prolongation of the abdomen, allied to *I. transiens*, Wlk., were also found therewith, together with other parasitic races.

Those appertaining to this category, which were obtained from the figs of *Ficus Indica*, will be described by Professor Westwood in treating of Walker's types of

like origin. Some of the apterous species are furnished with rudimentary alary appendages, consisting of a long filamentary multiarticulate process emanating from the mesonotum on either side, and coiling about among the legs. These, as well as a large-headed species having rudimentary wings of a different character, were in some few instances extracted from closed pericarps, distended, in the latter case, to larger dimensions, where they were doubtless parasitic on the original occupants of these abodes; the co-existence of a well-defined germ-feeding community having now been detected, which must have already quitted the figs of the same species of *Ficus* from which Walker's specimens were obtained. Hence it follows that whensoever the primary inmates of these seed-vessels have been duly determined by structural affinities, all divergent races found in those recesses must be regarded, *primâ facie*, unless otherwise authenticated, as hostile intruders which have only obtained such a habitaculum for their offspring when rendered available by the agency of their victims, in whose bodies oviposition has been effected while yet immature and incarcerated within. Casual visitants, which deposit their ova in the pulp after the phytophagous brood has effected its exit, are readily recognisable by their larval progeny, as in the case of the aforesaid obese grubs, the larvæ of *Oscinis*, and others.

It may here be observed that the heterogeneous association of predaceous and non-predaceous races among Walker's so-called *Agaonidæ* involves a palpable paradox, their severance being enjoined by due regard to their respective habits. Thus his fig species of *Idarnes*, no less than his supposed "neuters?" of *Sycobia*, and even his type of the latter,—a winged male, as Professor Westwood has lately determined,—now found concomitant with the germ-feeding brood of *Eupristina*, can have no tribal affinity with *Agaon*, whose natural alliance with *Blastophaga* was first pointed out by the latter, many years back, in our 'Transactions' (vol. ii., p. 223), the serrate mandibular appendages in both amply testifying to this effect. It would thus seem befitting to disintegrate this phytophagous group as a distinct subfamily of *fig-insects proper*, excluding therefrom all presumably parasitic types; the former being defined as *Sycophagidæ*, comprising two sectional divisions—the *Prionastomata* and the *Aploastomata*—founded upon their

respective mouth-parts; and the latter as *Sycocolacides*, unless appertaining to other sectional groups.

But this primary severance of the respective races would obviously seem to point to the incongruous position occupied of late by the *Sycophagides* among the entomophagous *Chalcididæ*, and, as a necessary corollary, to prescribe their transfer to a more congenial sphere, by restoring them, as heretofore, to the vegetable-feeding *Cynipidæ*, where their alliance is more naturally indicated. Exceptional instances have indeed been cited of the latter being abnormally addicted to parasitism; while, on the other hand, some of the *Eurytomides* are alleged to diverge from the well-known zoophagous propensities of their race, and to be not only plant-feeders, but also gall-producers, though many distinguished writers have hesitated to accept such an anomalous conclusion, which others have confidently expounded as the result of diligent investigation; but, be this as it may, the characteristic habits of these germ-devouring fig-insects—for whom all need of gall-protection is superseded by the nature of their domicile—assimilate them to cognate phytophagous communities, in accordance with the position previously assigned them, while militating against any confraternity with a hostile race having no kindred bonds of fellowship to constitute a family alliance therewith.

The economy of *Agaon*, whose structural characters had long proved so embarrassing, was utterly unknown when Latreille, at a venture, placed this genus next to *Eurytoma* in Cuvier's 'Animal Kingdom'; while its near allies, the *Blastophagæ*, are simultaneously adverted to, as a species employed in caprification, under the heading of *Cynips*, Linn.; and it would seem difficult to comprehend the rejection of their acquired title as such, when other far more aberrant instances present themselves of actual parasitism exceptionally witnessed among non-gallicolists (such as some species of *Figites*, *Allotria*, &c.) which are nevertheless tolerated in the same ranks with the *Cynipidæ* as co-heirs to their titular domain.

It appears, however, to have been assumed *à priori* as an axiom—when little was known upon the subject beyond the revelations of certain writers more or less antiquated—that *all* these fig-denizens were *fruit-feeders*; but subsequently, when other species were found commingled therewith—such as those brought from Madras

by Sir Walter Elliot and now in the British Museum—some difficulty was experienced as to discriminating between friend and foe; and thus, partly from this circumstance, partly also in consequence of certain fortuitous complications to which I shall presently advert, but mainly perhaps from the paucity of available materials, the subject has remained, as it were, in abeyance for a considerable period, during which the opportunities for prosecuting researches in a wider field were unaccountably neglected, as recently testified by Dr. Paul Meyer's elaborate Treatise on Fig-insects ('Zur Naturgeschichte der Feigeninsecten,' Mitth. d. Zool. Station z. Neapel, Bd. iii., Heft 4, 1882), citing a long list of various species of *Ficus* which have afforded evidence of the presence of such inmates; and, in fact, it must be incontestably evident that their name is legion, and their species a multiple of those hitherto recorded, disseminated under divers controlling influences through the lapse of ages, and bursting upon us as startling phenomena from time to time.

When, moreover, we consider the life-history of these diminutive races,—diversified in astounding variety in some of their most remarkable structural characters, while themselves attaining their maximum development within the seed-vessels of a dwarf-fig not exceeding, in many instances, half an inch in diameter, and constituting a little world of its own, which many of its inmates, blind from their birth, are destined never to quit, living in perpetual obscurity within this secluded domicile where organs of vision would be of no avail, but exercising their appointed functions in obedience to a common law regulating the just proportions of each race,—a tale of wonderment is told by these pigmy prodigies which affords a striking illustration of that dictum which our French entomological brethren have adopted as their motto, "*Natura maxime miranda in minimis!*"

In explanation of the fortuitous circumstances aforesaid, I must needs recite the several gradations whereby, almost imperceptibly, step by step, and without any deliberate intention, this federal dependency of the *Cynipidæ*, whilom unchallenged as such, became incidentally transferred to a hostile tribe, whose title—illegitimately acquired, as shown in the sequel—it behoves us to scrutinise, as the first step towards restoring this exiled community to its rightful inheritance.

When Gravenhorst drew attention thereto by his able "*Disquisitio de Cynipe Psene auctorum*," &c. ('Beiträge zur Entomologie,' 1 Heft, Breslau, 1829, p. 27), no other divergent types had been recorded in connection therewith; but, while adverting to the non-existence in his *Blastophaga* of a spiral ovipositor, such as Linnæus ascribed to the *Cynipidæ*, he nevertheless avows that Latreille refers the *Cynips psenes* to that family, and that *Blastophaga* must doubtless be comprised therewith, discarding the idea of any affinity between the latter and the *Chalcididæ*, as defined by Jurine, and stating that his species differed from any of the latter which he had seen, "*capite ovato-orbiculato et vitæ ratione*" (*loc. cit.*, p. 32).

Some years after (1837) Professor Westwood, in his interesting memoir on "Caprification, &c."—when discussing the merits of Dalman's alternative suggestion of a seeming analogy in his *Agaon* with the *Pteromali* and the *Codrini* (*Chalcididæ* and *Proctotrupidæ*), but especially with the former—expressed his opinion "that the curious little groups above described are certainly referable to the *Chalcididæ* rather than to the *Proctotrupidæ*"; adding that "from all these insects, however, they are at once removed by their fruit-feeding habits, as well as by various anomalous portions of their structure, so that I hesitate to name any particular group in that family to which they ought to be considered as most nearly allied" (*Trans. Ent. Soc. Lond.*, vol. ii., p. 223).

Subsequently Dr. Coquerel discovered certain strange-looking fig-insects in the Island of Bourbon, which he characterised as *abnormal parasites*, regarding them as "les femelles aptères et aveugles de quelque mâle ailé et inconnu" (*Rév. et Mag. de Zool.*, 2e série, Tome vii., 1855), these being the now recognised males of winged females, their legitimate partners having been maligned as "*Chalcidites* qui selon toute apparence s'étaient développés à leurs dépens!"

Thus, under the influence of such mistaken identity, a delusive character clung to both sexes of the genuine phytophagous brood; so that Walker, when describing Sir Walter Elliot's specimens from the *Ficus Indica* ('Notes on Chalcididæ,' 1871), consigned them all to his parasitic races, together with *Blastophaga* and *Sycophaga*, as alike "cradled in figs"—a principle which would not apply to all the inmates of galls—branding his calumniated



*Agaonidæ* with a felonious impress by placing Coquerel's figures of his "étranges parasites" as emblems and types of the whole, and superadding a tissue of romance on their fabulous affinities.

More recently Professor Westwood, while censuring Walker's peccadilloes, has reiterated his own predilections in favour of such an alliance, though obviously treating them in the aggregate as one joint-stock company, without contemplating the possibility and propriety of a dissolution of partnership between them; for, as he has elsewhere remarked, in speaking of the *Cynipidæ*, "it had always appeared to me contrary to nature that a tribe of *vegetable-feeders* should be arranged in the midst of *parasites*" (Mod. Class., vol. ii., p. 132); nor can it be conceivable that the essentials of structural qualifications should be fashioned in the same guise as equally adapted for germ-feeders and their antagonists. A specious superficial resemblance may, indeed, sometimes obtain between the aggressor and its victim; or, in cases of commensal fellowship, such as that of *Bombus* and *Psithyrus* (Trans. Ent. Soc. Lond., 1882, p. 307), both being *vegetable-feeders*, fraternising in the common banquet provided by the former; but in selecting *Callimome*, of parasitic habits, as the standard of comparison in this instance, there would be no *raison d'être* for such a similitude, no species of this genus having yet been found in these fig-abodes.

Nevertheless, Coquerel's figure of his supposed *Chalcis* (*op. cit.*, pl. x., fig. 4), or that of *Sycophaga* by Professor Westwood in our 'Transactions' (1882, pl. ii., fig. 2), are cited as offering convincing evidence "that the fig species are most nearly related to *Callimome*"; while it is averred that "the structure of the antennæ (even to the minute articulations following the 2nd joint), the fusion of the three terminal joints of these organs, the structure of the wings and wing-veins, and the long exerted straight ovipositor, sufficiently prove that these insects must be placed in the great family *Chalcididæ*" (*ibid.*, p. 50).

But, in propounding such a comparison between these parasitic and non-parasitic races, the application of the aforesaid tests to the germ-feeders collectively, or to their two selected representatives respectively, is by no means obvious, especially as regards the character ascribed to the ovipositor; for, although a newly-deve-

loped example of *Sycophaga* has been observed to expand this organ to its fullest extent in order to acquire a proper consistency, after being encircled and cramped within the small dimensions of the pericarp (*loc. cit.*, 1882, pl. ii.), yet it always retains, as in other instances, a curvate tendency in the sequel. Thus in the original description of the genus (*Trans. Ent. Soc. Lond.* vol. ii., p. 322), we read:—" *Oriductus trisetosus, setis æqualibus, abdominis duplo longioribus, et valde incurvatis,*" as represented (*ibid*) in pl. xx., fig. 5 k.

Taking, however, these tests *seriatim* (1) the minute articulations delineated by Professor Westwood in the antennæ of the female *Sycophaga* (*Trans. Ent. Soc. Lond.*, 1882, pl. ii., fig. 6), scarcely correspond with any in the same sex of *Callinome*; nor do they occur in *Blastophaga* (*ibid*, pl. v., fig. 51), whose antennæ, moreover, have the 4th joint produced into a long projecting spine, thus differing vastly from those of *Callinome*. The small annuli in the antennæ of the *Eurytomides*, as figured by Curtis in *Decatoma* (*Brit. Entom.*, pl. 345) are also witnessed among some of the fig-insects belonging to the parasitic races, but these differ essentially from the aforesaid articulations in the antennæ of *Sycophaga*; and the presence of such annuli in the alleged vegetable-feeding species of the former would seem to attest their ancestral "Unity of Habits" with others of the same group, however much their appetites may have become chastened by some mysterious dispensation. So also in Dr. Paul Meyer's figure (from Cavolini)\* of the supposed female of "*Ichneumon ficarius*" (*loc. cit.*, p. 564, pl. xxv., fig. 5, and pl. xxvi., fig. 13); the male, however, being evidently a *Sycosapter*, generically distinct from such female, which has a long ovipositor with a tubiform base, as described by Walker in *Idarnes transiens* (*Idarnella*, Westw.).

(2). As regards the fusion of the three terminal joints of the antennæ, this is not a reliable character throughout the germ-feeders, for it does not exist in *Eupristina* (Pl. I., fig. 14), nor in the Madagascar species (Pl. III., figs. 39, 40), both of which have these terminal joints distinctly separated from each other. So likewise in *Agaon*,

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\* FILIPPO CAVOLINI. "Memoria per servire alla storia compiuta del fico e della proficazione." Opuscoli scelti sulle scienze e sulle arti; Tome v., Milano, 1782. (Dr. P. Meyer, *l. c.*, p. 579).

as adverted to by Professor Westwood in his memoir on "Caprification," &c. (*l. c.*, vol. ii., p. 223), the "antennæ are terminated by three very large and *distinct joints*."

(3). The wing-veins also differ *inter se* in the germ-feeders, nor does *Callimome* coincide with *Eupristina* in this respect (Pl. I., fig. 4); while, irrespective of their phytophagous habits, these germ-feeders, in common with their aforesaid representatives, are separated from *Callimome* by other alary incongruities, such as the invariable absence of wings in the males.

(4). Furthermore, the long straight ovipositor is not a distinguishing characteristic of these phytivorous broods, this organ being remarkably *short* in *Blastophaga*, as well as in the Madagascar species (Pl. III., fig. 46); and in all matured examples it maintains the arcuate condition imparted by its original position within the seed-vessel as aforesaid, whether long or short. That this organ should be *exserted* is doubtless essential to the requirements of the race in their mode of oviposition, having, moreover, in some instances, if not in all, to penetrate within the young figs for this purpose, as testified of *Sycophaga* in our 'Transactions' (1878, p. 317), for which purpose a more bulky abdomen, like that of an ordinary *Cynips*, would be ill-adapted, although Latreille surmises that the ova of *Blastophaga* (*Cynips Psenes*, Linn.) are deposited in the pollen at an earlier stage (Cuv., Anim. Kingd., Genus *Cynips*).\* Such modified appliances, however, are constantly witnessed, and constitute connecting links between allied races, which may be no less recognised in this instance. Thus, in his incomparable standard work, the 'Modern Classification of Insects' (vol. ii., p. 117), Professor Westwood explains "that the borer of the *Urocerus* is but the saw of the *Tenthredo*, modified to fit it for its functions," the analogy between their structural details and the respective advantages derivable therefrom being also fully discussed. The same remarks apply equally to this implement in *Xiphydria* (*ibid*, p. 121). In *Oryssus* its

\* Count Solms-Laubach, by his recent researches at Naples, has ascertained that the female *Blastophagæ*, like those of *Sycophaga*, penetrate into the wild figs for the purpose of depositing their eggs. He frequently found a mass of their wings adhering thereto where many had effected their entrance together, and they subsequently die within. ("Die Herkunft, Domestication, und Verbreitung des gewöhnlichen Feigenbaum; Von H. Graf zu Solms-Laubach." Göttingen, 1882).

structure is still more anomalous, this genus being considered by Dahlbom as constituting the "connecting link" between the "gall-flies" and the "saw-flies" (*ibid*, p. 124), where the phytophagous fig-species may not inappropriately intervene as a primary group of the *Cynipidæ*. The inferences to be deduced from such modifications, where corresponding habits disclose associating links, are well exemplified in the reasons adduced by Professor Westwood for the transfer of the *Uroceridæ* from the position assigned to them by St. Fargeau; his nomenclature and arrangement being repudiated "because neither appear to have a *foundation in nature*, the precise construction of the ovipositor in his different groups not having been correctly ascertained, whilst we have already seen that there are no grounds for the insertion of the *Uroceridæ* amongst the parasitic insects" (*ibid*, p. 123). Thus modifications in structure, implying corresponding differences in economy, must not be held to supersede all considerations reposing on physiological facts. In like manner the ovipositor in these germ-consumers was well known to Linnæus when he described his *Cynips Psenes* as "*aculeo exserto, sed debili, laxo, ut vix videatur Cynips esse*"; yet he had no scruple to associate this and Hasselquist's other fig-species with the *Cynipidæ*. Moreover, as compared with *Callimome* (Curtis, *loc. cit.*, pl. 552), the organisation of the terebra in these fig-devotees of the germ-feeding race is essentially different, as emanating from a depressed valve at the base of the 5th segment, thus described by Gravenhorst in *Blastophaga*: "*Terebra setiformi, vaginis graciliore, situ certo, cum nempe infra ventrem reclinatur, e valvula ad basin segmenti quinti porrecta*" (*loc. cit.*, p. 29). This valve is shown in my figures 15, 29, and 46.

In fact we are confronted with anomalous ovipositors in all the intervening links between the *Tenthredinidæ* and the *Cynipidæ*; but, in these germ-nurtured fig-voluptuaries, such modifications are not unfrequently emphasised to a remarkable extent in their buccal organs, by those peculiar serrate processes, of marvellous devices, which many of them exhibit as mandibular appendages, having no parallel elsewhere; while, from their inherited instincts, the same ruling must apply to them as to the *Uroceridæ*—that there are no grounds for the insertion of these vegetarians amongst the parasitic insects. Nevertheless, in comprising the *Cynipidæ* among the "*Entomophaga*," the same exemption from unnatural associates



was not extended to them ; while admitting that “ if we employ terms founded upon the *habits* of the different families ” (as in this instance) “ we must introduce the gall-flies amongst the *plant-feeders* (*Phytophaga*) ”—(Mod. Class. ii., p. 124).

With reference to the dentate genital claspers adverted to “ as a further illustration of the relationship between some of the fig-insects and other well-known parasitic *Chalcididæ* ” (Trans. Ent. Soc. Lond., 1882, pp. 325, 326), I would observe that this character can have no application to tribal distinctions, inasmuch as its presence alike in the germ-feeding *Sycophaga* and in several of its parasitic associates, having no kindred connections therewith, must serve to discountenance any such inference ; while the absence of similar retinacula in the corresponding sex of *Callinome* does not enhance its claim to be regarded as allied to *Sycophaga*. This, however, is a character which has been very little studied hitherto, and may be found to have a wider application, irrespective of family associations.

Hence it follows that, whether looking to structural endowments or correlative propensities, these fig-dwellers of the phytophagous broods are in nowise disqualified for their ancestral status by the results of such an ordeal, any more than by their adopted habitat, for, as Hasselquist observes, “ *Gallæ locum obtinet hæc ficus* ” ; the severance of the respective races being readily effected by the light of analogy ; or if, indeed, the results thus obtained should in any instance prove fallacious, the remedy is obvious, such liability, however, being of minor import than the inconsistency involved in the promiscuous intermingling of alien races consequent upon an innovation of the last decade, founded on misconception, and irreconcilable with probationary tests.

In reverting, therefore, to their time-honoured kinship, the *Cynipidæ* would be divisible into three subfamilies, (1) the *Sycophagides*, (2) the *Cecidophagides*, and (3) the *Heterophagides*, or aphidivorous *Cynipidæ*,\* constituting, as long since suggested by Prof. Westwood (Mod. Class. ii., p. 124), “ the connecting link ” with the aphidivorous *Braconides* ; the hitherto known fig-feeders being tabulated as follows :—

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\* The tendency of such heteroclitcs to revert to their ancestral habits is well exemplified in the instance cited by Dr. Harris, and referred to by Prof. Westwood in his ‘Memoir’ on the “*Eurytomides*” (Trans. Ent. Soc. Lond., 1882, p. 311), when “some of these insects that came from a straw-bed, and were shown to Dr.



## CYNIPIDÆ, Westw.

## SYCOPHAGIDES.

## Division 1. Prionastomata.

BLASTOPHAGA, Grav. (Cynips, Hasselq.; Linn., Fab., Latr.).

Sp. 1. *B. ficus*, Hasselq.; *C. psenes*, Linn.; *B. sycomori*, Westw.Sp. 2. *B. caricæ*, Hasselq.; *C. psenes*, Linn.Sp. 3. *B. grossorum*, Grav.

AGAON, Dalman.

Sp. 1. *A. paradoxum*, Dalm.

SYCOCRYPTA, Coquerel.

Sp. 1. *S. cæca*, Coq.

EUPRISTINA, n. g.

Sp. 1. *E. masoni*, n. s.

PLEISTODONTES, n. g.

Sp. 1. *P. imperialis*, n. s.

KRADIBIA, n. g.

Sp. 1. *K. cowani*, n. s.

## Division 2. Aploastomata.

SYCOPHAGA, Westw. (Cynips, Hasselq., Linn., Fab.).

Sp. 1. *S. sycomori*, Linn.; *C. sycomori*, Hasselq.*S. crassipes*, Westw.

APOCRYPTA, Coquerel. (Sycophaga, Westw.).

Sp. 1. *A. paradoxa*, Coq.Sp. 2. *A. perplexa*, Coq.

## KRADIBIA COWANI.

This new genus and species has been obtained from some small figs brought to this country from Madagascar by the Rev. W. Deans Cowan, who states that they were found in the Forest of Fianarantsoa, in the south-central district of the island, about four miles from Antananarivo, the capital. Mr. Cowan explains that, so far as he can recollect, "the tree was very high, about nine inches in diameter, and the fruit of a strawberry-red colour, attached to the trunk at nearly the whole

H., had proved very troublesome to children sleeping on the bed, their bites or stings being followed by considerable irritation, which lasted several days; so numerous were the insects that it was found necessary to empty the bed-tick and burn the straw."

height of the tree below the branches, and found in clusters of four and five together."

On inspecting these figs after their arrival it was evident that a portion of the inmates had already effected their egress, though some of the females had died when in the act of emerging from the seed-vessels, several of the apterous males, together with a few of their winged partners, still adhering to the glutinous orifice of the passage whereby others of the brood had escaped, this being the first instance on record in which any of the former have been known to quit the fig. Both sexes are smaller than the European *Blastophagæ*; the males have an obcordate head, with short six-jointed antennæ projecting from the clypeus; their broad trigonate mandibles, bidentate at the apex, forming, when closed, a transverse prominent line in front, and their eyes conglomerate within black triangular maculæ (as seen in balsam slides). The males are remarkable as having only *four* developed legs, the middle pair being obsolete. Traces thereof have, however, been detected under the microscope, in a very rudimentary form, not otherwise perceptible, in some transparent specimens mounted in balsam, consisting of two biarticulate appendages, of minute dimensions, which may be detached in dissected specimens, and which are shown in their natural position, affixed to the posterior margin of the mesosternum, in Plate III., fig. 47. When viewed laterally, as in fig. 32, these quadrupedal males, standing on their short robust legs, with projecting head, are somewhat suggestive of a miniature pachyderm—*si parva licet componere magnis*.

The pronotum is very large, rounded in front and deeply emarginate at the base, with long projecting angles directed backwards; the mesonotum is semi-circular and broadly truncate behind; the metanotum is longer than wide, narrower and truncate behind, with the sides rounded. The legs have their femora much distended; those of the first pair are longer and broader than those of the hind legs; the tibiæ of the first are very short, and as wide as long, terminating in two incurvate spines forming a large crescent; their tarsi are biarticulate and robust, with large prominent claws; the hind tibiæ are longer than the fore tibiæ, narrow at the base and truncate at the apex, with two short spurs at each angle and three or four sharp teeth near the apex on the outer margin; their tarsi are 5-

articulate, the basal joints short, the 5th longer, with small claws.

The female has a short ovipositor like *Blastophaga*, from which it diverges in the structure of the antennæ, which have some resemblance to those of *Eupristina* in their terminal joints and setose character; but it differs from the latter in the veining of the wings, which have the cubitus deflexed on the disc, and in its simple 5-serrate mandibular appendages. The head is small and oval, and the mandibles, as well as their appendages, short and broad. The antennæ are ten-jointed, the basal joint large and elongate, narrower at the apex, with an angular distension on the inner side; the 2nd joint longer than broad, and slightly sinuous; the 3rd forming a long, acute, curvate, projecting spine; the 4th is shorter than the 5th; and the 6th to the 9th are cyathiform, densely clothed with coarse recumbent setæ, the 6th being more elongate than the others, and the terminal joint fusiform. Thus in these antennæ the 3rd and 5th joints of other genera are obsolete. The last four joints are also partially retractile at the base and deeply inserted respectively within the apex of each preceding joint, being occasionally expanded to their full extent, thus imparting a versatile character to these organs, both conditions being sometimes exemplified in the same specimen.

The thorax is short and gibbous; the fore wings very elongate, having the post-costal vein widely separated from the costa at its base, but conjoined subsequently, and the cubital vein deflexed on the disc of the wing in a slight outer curve, terminating in an oblong clavate apex. The hind wings have the costa and post-costal vein coalescent and strongly arcuate at the base of the wing, extending obliquely beyond the anterior margin, where terminating in a small tubercle bearing two or three hooklets; the entire disc of all the wings is interspersed with short recumbent setæ, and surrounded with a deep marginal fringe. The fore and hind legs are of moderate dimensions, and the intermediate pair slender and elongate. The abdomen is oval, about equal in length to the thorax; the ovipositor short and setiform, not exceeding one-fourth the length of the former beyond its apex, with the sheaths shorter, robust, and falcate.

The remarkable circumstance of the absence of the middle pair of legs in the males has been consistently

maintained in the many specimens which I have examined, otherwise perfect, coupled with an abnormal development of the fore and hind femora, which closely approximate laterally; their antennæ, with a central conical joint deeply embedded within the next in succession, are also very peculiar; while the four terminal retractile joints of these ten-jointed organs in the females readily serve to separate this sex from any known genus.

KRADIBIA,\* n. g.

*Mas apterus*. Caput parvum, obcordatum. *Oculi* plus minusve conglomerati. *Mandibule* minimæ, trigonæ, recta linea transverse valde porrectæ, apice bidentatæ, dentibus obtusis. *Antennæ* 6-articulatæ, glabræ; articulo basali parvo, obtrigono, 2do magno, subovato, latere interno medio dilatato, apice truncato; 3tio brevi, curvato, dimidio basali constricto; 4to minimo, conico, apice intra 5ti basin profunde inserto; 5to elongato, latitudine duplo longiore, basi apiceque truncato, lateribus subparallelis; extimo (6to) simili sed brevior, apice conico. *Palpi* obsoleti. *Thorax* capite dimidio latior; pronoto magno, antice rotundato, angulis posticis valde productis, acuminatis; mesonoto semicirculari metanoto longiore, postice late truncato. *Pedes* antici breves; coxis parvis, subquadratis angulis rotundatis; femoribus maximis, latis; tibiis brevibus, robustis, apice dilatatis, angulis in spinas acutas, incurvas, valde productis; tarsis parvis, crassis, biarticulatis, articulo 2do longiore; unguibus magnis, basi dilatatis, dente brevi utrinque instructis. *Pedes intermedii* desunt; appendicibus duabus minimis biarticulatis, articulis subrotundis, basali majore, ad mesosternum postice affixis, licet obtectis necnon ob exiguitatem vix detegendis, tantum indicati. (Tab. III., fig. 47). *Pedes postici* coxis parvis oblongis; femoribus ut in anticis latis, parum brevioribus; tibiis longioribus, basi tenuioribus, apice sensim latioribus, truncatis, angulis utrinque bimucronatis, margine externo setis paucis tenuibus, dentibusque obtusis 4 prope apicem, instructis; tarsis 5-articulatis, articulis 1—4 brevibus, apicali duplo longiore; unguibus mediocribus, pulvillis dilatatis. *Abdomen* basi inflatum, sphaericum, segmentis apicalibus tenuibus, elongatis, sæpe subter truncum retro deflexis.

\* κράδιον, *ficus sylvestris*.

*Fœmina* alata. *Corpus* parvum. *Caput* breve, angulis anticis prominulis, longitudinaliter late canaliculatum. *Oculi* ovales, laterales. *Ocelli* invis. *Mandibulæ* breves, latæ, apice bidentatæ, acutæ, basi subquadratæ, appendicibus basalibus parvis, transverse striatis, latere interno 4-serratis. *Antennæ* 10-articulatæ; scapo magno, oblongo, latere interno prominulo, basi apiceque angustiore; articulo 2do robusto, curvato; 3tio in spinam elongatam, curvatam, acutem, externe producto; 4to parvo, oblongo; reliquis setis crassis elongatis dense vestitis; 5to brevi; 6to, 7mo, 8vo, 9no, magnis, cyathiformibus; extimo (10mo) fusiformi, setis oblecto; articulis ultimis quatuor nonnunquam valde productis, vel singulis sese in antecedentem retractilibus. *Thorax* capite dimidio longior, latitudine coequalis; pronoto brevi, antice attenuato, postice incurvato; mesonoto transverso, lato; metanoto longiore, postice rotundato. *Pedes* antici validi; coxis elongatis; femoribus longis, robustis, externe rotundatis, latere interno subrectis; tibiis brevissimis, curvatis, apice latis, truncatis; tarsis longis, gracilibus, 5-articulatis; unguibus parvis. *Pedes intermedii* longi, coxis semicircularibus; femoribus elongatis, tenuibus; tibiis longioribus, gracillimis, apice sensim sed parum latioribus, calcare tenui; tarsis longis, filiformibus, 5-articulatis, unguibus parvis. *Pedes postici* coxis robustis, ovatis; femoribus brevibus, vix inflatis, apice tenuioribus; tibiis brevissimis, apice latioribus, truncatis, angulo interno calcaribus duobus validis armatis; tarsis gracilibus, 5-articulatis, articulo basali longiore; unguibus mediocribus. *Alæ* omnes disco setis elongatulis recumbentibus sparsim instructæ, marginibus late fimbriatis; *anticæ* longæ; vena postcostali, basi valida, cum costa coalita, medio divergente, arcuata; vena cubitali in discum deflexa, parum externe curvata, clava oblonga, truncata, oblique terminata. *Alæ posticæ* angustæ, apice subacuminatæ; vena postcostali cum costa conjuncta, arcuata, basi valida, prope marginis mediam externe producta, apice tuberculata setisque deflexis paucis brevibus instructa. *Abdomen* ovale, terebra setiformi, brevi, abdominis quartam partem longitudine vix eccedente; valvulis brevioribus, robustis, arcuatis.



*Kradibia cowani*, n. s.

*Mas* capite, thorace, pedibusque fulvis, antennis pallide flavis, abdomine albedo. *Fœmina* capite, antennis, thoraceque piceis, pedibus, abdomineque fulvis, alis cinereis, venis fulvescentibus. Long. corp.—mas,  $1\frac{1}{2}$  mm.; fœmina, 2 mm. Expans. alar,  $3\frac{1}{2}$  mm.

*Hab.* Cernes insula, Dom. W. D. Cowan cum ficibus communicavit.

In Mus. Britannico et nostro.

A single parasitic species was found in these Madagascar figs, whereof I noticed only two examples. They may be easily confounded with the males of *Kradibia*, being very similar in general appearance; but they are at once recognisable by their fully-developed intermediate legs and other structural characters, being also prominently palpigerous, with conglomerate eyes. They constitute a new species of *Sycosapter*, the description of which is hereto appended.

*Sycosapter gibbus*, n. s.*Characteres e maribus descripti.*

Fulvescens, apterus, *Kradibii* mares simulans; capite elongato, prominulo, basi rotundo; oculis conglomeratis; mandibulis crassis, longis, subrectis, apice obtusis sursum curvatis; palpis maxillaribus longulis, infra prominulis, articulis duobus apicalibus parvulis, extimo seta longa instructo. Antennæ structuræ solitæ in hoc genere, pallide flavæ. Alæ rudimentariæ nullæ. Pedes antici robusti, femoribus magnis, subovatis; tibiis brevibus, apice multispinosus; tarsis 5-articulatis, articulis 4 basalibus flavescentibus, brevissimis, latis, oblique compressis, sinuatis, extimo rufo-piceo, magno, elongato, basi tenui, apice lato, rotundato, unguibus, pulvillisque majusculis. Pedes intermedii similes sed minores, cætera ut in anticis. Pedes postici majores, femoribus magnis, ovatis; tibiis longioribus, curvatis, basi constrictis, apice late truncatis, margine antico latereque externo spinis plurimis validis instructis; tarsis ut in anterioribus sed majoribus, unguibus pulvillisque elongatis. Long. corp.  $1\frac{1}{2}$  mm.

*Hab.* Cernes insula, cum *Kradibia cowani* in ficibus ipsis commixti.

In Mus. Britannico et nostro.

## EXPLANATION OF PLATES.

## PLATE I.

- FIG. 1. *Eupristina masoni*, male, magnified.
2. Retractable apex of abdomen of ditto.
  3. The male, seen laterally, with the abdominal segments extended.
  4. The female, magnified.
  5. The head of ditto, seen laterally.
  6. Mandible of the male.
  7. Antenna of ditto.
  8. Fore leg of ditto.
  9. Coxa of the same.
  10. One of the mandibles of the female, seen from below, with its serrate basal appendage and appendiculated serrate lateral lobe.
  11. The same, seen obliquely, showing the seven teeth of the lateral lobe, and the eleven teeth of the principal appendage.
  12. The same, seen more obliquely.
  13. The same, seen transversely, showing the duplex series of teeth.
  14. Antenna of the female.
  15. Abdomen and ovipositor of ditto.

## PLATE II.

16. *Pleistodontes imperialis*, male, with abdomen fully extended, magnified.
17. The female, magnified.
18. Head and prothorax of ditto, seen laterally.
19. Mandible of the male.
20. Antenna of ditto.
21. Upper horizontal section of head of ditto.
22. Lower section of ditto.
23. Fore leg of the male.
24. Mandible of the female, with its multiserrate basal appendage seen from below.
25. The same, seen transversely.
26. Antenna of the female.
27. Middle leg of ditto.
28. Hind leg of ditto.
29. Abdomen and ovipositor.
30. The ovipositor, extracted.

PLATE III.

- FIG. 31. *Kradibia cowani*, male, magnified.
32. Ditto, seen laterally.
  33. The female, magnified.
  34. Head of ditto, seen laterally.
  35. Mandible of the male.
  36. Antenna of ditto.
  37. Mandible of the female, seen from below.
  38. Ditto, seen transversely, showing the 5-serrate basal appendage.
  39. Antenna of the female, with the terminal joints contracted.
  40. The five terminal joints of ditto, naturally expanded.
  41. Anterior portion of fore wing of the female.
  42. Hind wing of ditto.
  43. Fore leg of ditto.
  44. Middle leg of ditto.
  45. Hind leg of ditto.
  46. Abdomen and ovipositor of ditto.
  - 46a. Apex of ventral valve.
  47. Minute rudiments of middle legs of the male, as found *in situ*.